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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P1784-100A		FOR FURTHER ACTION See Form PCT/IPEA/416																									
International application No. PCT/SE2003/001915	International filing date (day/month/year) 09.12.2003	Priority date (day/month/year) 31.01.2003																									
International Patent Classification (IPC) or national classification and IPC D21C 9/02, D21C 9/10																											
Applicant Kvaerner Pulping Aktiebolag et al																											
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>3</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of <u>4</u> sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>																											
<p>4. This report contains indications relating to the following items:</p> <table><tr><td><input checked="" type="checkbox"/></td><td>Box No. I</td><td>Basis of the report</td></tr><tr><td><input type="checkbox"/></td><td>Box No. II</td><td>Priority</td></tr><tr><td><input type="checkbox"/></td><td>Box No. III</td><td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td></tr><tr><td><input type="checkbox"/></td><td>Box No. IV</td><td>Lack of unity of invention</td></tr><tr><td><input checked="" type="checkbox"/></td><td>Box No. V</td><td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td></tr><tr><td><input type="checkbox"/></td><td>Box No. VI</td><td>Certain documents cited</td></tr><tr><td><input type="checkbox"/></td><td>Box No. VII</td><td>Certain defects in the international application</td></tr><tr><td><input type="checkbox"/></td><td>Box No. VIII</td><td>Certain observations on the international application</td></tr></table>				<input checked="" type="checkbox"/>	Box No. I	Basis of the report	<input type="checkbox"/>	Box No. II	Priority	<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/>	Box No. VI	Certain documents cited	<input type="checkbox"/>	Box No. VII	Certain defects in the international application	<input type="checkbox"/>	Box No. VIII	Certain observations on the international application
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Date of submission of the demand 14.07.2004		Date of completion of this report 12.04.2005																									
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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/SE2003/001915

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1 - 12 _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☒ the claims:
- pages _____ as originally filed/furnished
- pages* _____ as amended (together with any statement) under Article 19
- pages* 1 - 4 received by this Authority on 17.12.2004
- pages* _____ received by this Authority on _____
- ☒ the drawings:
- pages 1 - 4 _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to the sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/SE2003/001915

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-24</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-24</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-24</u>	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

Documents cited in the International Search Report:

D1: US 3698995 A

D2: US 4104114 A

The cited documents represent the general state of the art. The invention defined in claims 1-24 is not disclosed by any of these documents.

The cited prior art does not give any indication that would lead a person skilled in the art to the claimed method of bleaching pulp in a bleaching line and the claimed bleaching line. Therefore, the claimed invention is not obvious to a person skilled in the art.

Accordingly, the invention defined in claims 1-24 is novel and is considered to involve an inventive step. The invention is industrially applicable.

CLAIMS

1. A method of bleaching cellulose pulp in a bleaching line, having at least two bleaching steps comprising a first (D₁) and a second (D₂) bleaching step, as seen in
5 the direction of flow of the cellulose pulp, which bleaching steps have wash apparatuses (W₄, W₅) for the pulp arranged after the first and the second bleaching step, respectively, and in which wash liquor and where appropriate dilution liquor is led in principle in counter-current to the pulp flow through the bleaching steps in the bleach line, characterised in that a substantial portion of the wash liquor, or
10 all of it, is supplied by means of a main conduit (1), wherein
 - each one of said wash apparatuses (W₄, W₅) is independently supplied by means of first branch conduits (L₁, L₃) connected to said main conduit (1),
 - each one of said wash apparatuses (W₄, W₅) independently bleeds out wash filtrate by means of second branch conduits (L₂, L₄) connected to said main conduit (1), and
15 said main conduit has an outlet end (10) which bleeds out at least some of said wash filtrate from said wash apparatus (W₄, W₅).
2. A method according to claim 1, characterised in that said main conduit has an
20 inlet end which under steady state conditions continuously is fed with wash liquid and an outlet end (10) which under steady state conditions continuously bleeds out at least some of said wash filtrate from said main conduit.
3. A method according to claim 2, characterised in that the inlet and outlets ends
25 are arranged at opposite ends of the main conduit with said branch conduits connected to the main conduit inbetween the inlet and the outlet.
4. A method according any of the above claims, characterised in that the main
30 conduit is connected to receive and distribute filtrate that is mainly acidic or mainly alcalic.
5. A method according to claim 4, characterised in that there are two main
conduits, one to receive and distribute mainly alkaline filtrate and one to receive and distribute mainly acidic filtrate.
- 35 6. A method according to any preceding claim, characterised in that upstream a first branch position (A1) in the upstream end of the main conduit (1), a main pressurising device (P20) is provided which supplies fresh wash liquid and

5 pressurises the main conduit and establishes a basic flow in the main conduit in a direction in the main conduit in reverse to the formed flow of cellulose pulp in the bleaching line, wherein preferably said pressurising device being located connected to the main conduit at a position at the opposite end in the main conduit in relation to the outlet end (10).

7. A method according to any preceding claim, characterised in that said filtrate is led to the main conduit (1), via a pump device (P21'; P22').
- 10 8. A method according to any preceding claim, characterised in that the pressure within the main conduit (1) is maintained at a pressure of at least 0,5 bar above atmospheric pressure.
- 15 9. A method according to claim 8, characterised in that the pressure within the main conduit is maintained, during steady state, at a pressure below 3 bar, preferably within the range of 1 – 2 bars pressure above atmospheric pressure.
- 20 10. A method according to claim 9, characterised in that wash liquor is led from the main conduit to the respective wash apparatuses (W₅, W₄) via each respective supply line (L_{1A}, L_{3A}), by means of a pump devices (P21, P22).
- 25 11. A method according to claim 9 or 10, characterised in that dilution liquid to at least one position of the bleach line is supplied directly via a branch line (L_{1B}) connected to the main conduit (1).
- 30 12. A method according to claim 8, characterised in that the pressure in said main conduit, during steady state, is maintained within the range 3 – 20 bar, preferably 4 – 10 bar, more preferred about 5 – 6 bar above atmospheric pressure, whereby in the preferred mode supply pumps for wash filtrate may be dispensed with.
- 35 13. A method according to any preceding claim, characterised in that an intermediate bleach step (EO-EOP) is provided intermediate said at least two bleach steps, which bleach step has an opposite pH-level compared to said two bleach steps, wherein at least a portion of the filtrate from a wash apparatus (W₃) belonging to said intermediate stage is not taken back to the main conduit (1).

14. A method according to claim 1, characterised in that the outlet (10) is controlled by a pressure and/or flow controlling valve.
15. A method according to claim 14, characterised in that said pressure and flow control valve, can achieve feed back control of the main pressurising device (P20) to secure a predetermine pressure and/or flow through the main conduit (1).
16. A method according to claim 15, characterised in that the flow at said outlet, during steady state, is within the range $0,1 - 12 \text{ m}^3$, preferably normally within $0,5 - 10 \text{ m}^3$.
17. A bleaching line for bleaching cellulose pulp in a bleaching line, having at least two bleaching steps comprising a first (D_1) and a second (D_2) bleaching step, as seen in the direction of flow of the cellulose pulp, which bleaching steps have wash apparatuses (W_4 , W_5) for the pulp arranged after the first and the second bleaching step, respectively, and in which wash liquor and where appropriate dilution liquor is led via lines (L_1 , L_3 ; L_1A , L_3A) in principle in counter-current to the pulp flow through the bleaching steps in the bleach line, characterised in that there is arranged a main conduit (1) to supply a substantial portion of the wash liquor, or all of it, wherein
 - each one of said wash apparatuses (W_4 , W_5) is independently connected to said main conduit (1) by means of first branch conduits (L_1, L_3),
 - each one of said wash apparatuses (W_4 , W_5) is independently connected to said main conduit (1) to bleed out wash filtrate by means of second branch conduits (L_2, L_4), andsaid main conduit is arranged with an outlet end (10) to bleed out at least some of said wash filtrate from said wash apparatus (W_4 , W_5).
18. A bleaching line according to claim 17, characterised in that the outlet end is arranged opposite an inlet end of the main conduit, with said branch conduits (L_1 , L_3 ; L_2 , L_4) connected to the main conduit inbetween the inlet end and the outlet end (10).
19. A bleaching line according to claim 1 or 2, characterised in that there are two main conduits, one to receive and distribute mainly alkaline filtrate and one to receive and distribute mainly acidic filtrate.

20. A bleaching line according to any of claims 17 - 19, characterised in that upstream a first branch position (A1) in the upstream end of the main conduit (1), a main pressurising device (P20) is provided to supply fresh wash liquid and to pressurise the main conduit (1).
- 5 21. A method according to any of claims 17 - 20, characterised in that a pump device (P21'; P22') is arranged within at least one of said branch conduits (L₂, L₄) to pump said filtrate to the main conduit (1).
- 10 22. A bleach line according to any of claims 17 - 21, characterised in that there is arranged at least one branch line (L₁B) connected to the main conduit (1), to supply dilution liquid to at least one position of the bleach line.
- 15 23. A bleaching line according to any of claims 17 - 22, characterised in that the outlet (10) is arranged with a control device, preferably in the form of a pressure and/or flow controlling valve.
- 20 24. A bleaching line according to claim 23, characterised in that said control device and/or said main pressurising device (P20) is connected to a pressure sensing device (PC) to control pressure and/or flow in the main conduit (1).